WELLNESS THROUGH THE LENS OF GATHERING, GARDENING, AND GROCERY

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Abstract

The food environment in rural Alaska has undergone a rapid transition as communities have gone from subsistence to cash based economies. As this nutrition transition continues and is further impacted by climate change, rural Alaskans need diverse food sources to maintain health and improve resilience. The objective of this research was to assess the role cultivated and wild plants play in wellness, and to understand current perceptions of gardening as a source of vegetables and improved wellness in Barrow, Alaska. A mixed methods approach was used, the qualitative component consisting of seven focus groups, 60 minutes each, which were audio recorded. Following each focus group, a questionnaire was administered to all participants. Focus group recordings were transcribed and coded in Atlas.ti for themes. Questionnaire data were compiled in Microsoft Excel and analyzed using descriptive statistics. Alaska Native adults were recruited to participate through snowball and convenience sampling. The study found that gathering played a strong role in wellness, in particular as it relates to nutrition, connection to the land, traditional foods, culture, and medicine. However, participants also reported lacking knowledge about plants from the tundra. The overwhelming majority of plants consumed were from the grocery store. In contrast to gathered plants, participants' perceived that plants from the grocery store only address one dimension of wellness—dietary health. Gardening was perceived as a valuable new local source of fruits and vegetables. These results provide insight into the role that plants play in wellness in an Alaska Native community that is experiencing a nutrition transition. This study found that fruits and vegetables from the garden, grocery store, and tundra each play important, but different roles in wellness. This is consistent with previous studies and highlights the importance of considering each source when addressing wellness in

Alaska Native communities. In addition, having a diverse food portfolio that includes fruits and vegetables from all three sources, especially local sources, is key to achieving food security and sovereignty.

Table of Contents

Page

Signature Page i

Title page iii

Abstract v

Table of Contents vii

List of Tables ix

Acknowledgements xi

Chapter 1 Literature Review 1

Introduction: Exploring Plants as a Means to Promote Holistic Wellness 1

Wellness Through the Lens of Gathering and Gardening 1

Nutrition and the Nutrition Transition 2

Food Security 4

Native Plant Usage 6

Traditional Knowledge 8

Arctic Gardening 10

Wellness 12

Connecting to the Land 14

Why Gardening and Gathering? 15

Concluding Thoughts 17

References 19

Page

Chapter 2 Wellness through the lens of gathering, gardening, and grocery 25

Abstract 25

Introduction 26

Methods 28

Study Design 28

Setting 29

Participants 30

Measures 30

Analyses 31

Results 32

Gathering 32

Grocery 34

Gardening 36

Discussion 37

Limitations 40

Conclusion/Implications for Future Research and Practice 41

References 43

Appendix 49

List of Tables

Page

Table 1 Demographic Data for Adults in Focus Groups (n=18).....47

Table 2 Ethnobotanical Questionnaire Responses from Adults in Focus Groups (n=18).....48

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Chapter 1 Literature Review

INTRODUCTION: EXPLORING PLANTS AS A MEANS TO PROMOTE HOLISTIC WELLNESS

This thesis discusses the role plants play in wellness and how three sources of plants (gardening, gathering, and grocery stores) can address the changes in lifestyle and diet, known as the nutrition transition, and subsequent food security and health issues that have come about because of the transition.[1, 2] In order to address wellness in a holistic manner, all the components that make up health from an Indigenous perspective were studied. Plants play an important role in wellness, providing fiber and micronutrients on a nutritional level.[3] In some circumstances, they encourage physical activity, social connections, and mental wellbeing.[4-6] While it is understood that plants play an important role in overall health, the current role they play in northern Alaska and their potential to have an even greater impact on health in that region is relatively unknown. In order to inform research exploring the role different sources of food plants play in wellness, this chapter will review literature concerning changes in diet, plants as sources of fruits and vegetables, food security, and the importance of culture in wellness.

WELLNESS THROUGH THE LENS OF GATHERING AND GARDENING

People have always had a relationship with their surrounding ecosystem, its components being necessary for the survival of all species. Through these relationships with the ecosystem people gain knowledge.[7, 8] Knowledge of plants is an important part of traditional knowledge, and the study of this interdisciplinary, multifaceted relationship is referred to as ethnobotany.[3] Building these relationships with plants is important because of the role they play in food, medicine, structures, tools, warmth, shelter, and spirituality.[3] These traditions influence how

people define themselves culturally, create social connections, and provide nutrients.[7] To better understand the past and potential future importance of plants to the Iñupiat people, literature on current food issues, traditional knowledge and gathering practices, the history of gardening in the Arctic, and the relationship between the land and wellness will be described. The potential role of gardening as a means to supplement food security and nutrition will also be explored.

NUTRITION AND THE NUTRITION TRANSITION

Indigenous peoples of the North have been experiencing a nutrition transition over the past century. [2, 9-11] It is important to understand this transition from historical and cultural perspectives.[11, 12] The Iñupiat of northern Alaska subsisted on a combination of marine mammals, fish, and wild greens and berries prior to the arrival of Europeans.[13] This diet was high in nutrients and low in refined carbohydrates, but as trappers, missionaries, and explorers encroached, they brought with them sugar, flour, and other processed foods.[14] With the continued influx of outsiders, the economy transitioned from a subsistence, trade based economy to one based on cash. As technology improved and a dependence on oil increased worldwide, rural Alaskan's adapted and adopted the new technologies. Hunting became easier with transportation changes such as the snow machine, which required hunters to have jobs to earn money to buy gas and parts for this new technology. This created a cycle of interdependence that affects every aspect of life, including diet. As people have to work more to earn money to participate in subsistence activities, they also began to depend more on quick and easy foods. Time consuming activities such as gathering greens, which do not supply much in the way of calories decreased and dependence on the local grocery store increased. [9]

This transition away from traditional foods and toward highly processed, high sugar foods is thought to be responsible for the increase in diabetes and obesity in northern latitudes[2, 9-11, 15] and is an expression of the failure of the current food system.[16] Diabetes was the seventh leading cause of death in Alaska and 66% of Alaskan adults were obese in 2014.[17] Sugary beverages such as soda were among the top four items consumed in a food intake study conducted throughout Alaska.[18] Micro and macro-nutrients in traditional foods were determined to be significantly different than those found in western foods. [9, 11] Understanding the changes in dietary composition and the traditional plants that remain a part of the diet will lead to insights about the importance of specific species, their contribution to nutrition, their geographic proximity and availability, and their relationship to culture.[19]

While traditionally people obtained the nutrients needed from marine mammals, fish, and game animal organs, such as caribou stomachs, the nutrition transition that has occurred in the north resulted in people needing to seek different sources of nutrients. Dietary changes such as those that occur through a nutrition transition, are complex and can have positive or negative effects on a community. For example, while the western diet has led to increased sugar consumption, a factor contributing to tooth decay and periodontal disease,[20] the western diet also includes fruits and vegetables which are often lacking in Arctic diets and have been proven to lower the risk for cancer.[21] Cancer and heart disease are the leading causes of death in Alaska Native people and both are directly affected by diet. [22, 23]

Market and traditional foods both have the potential to provide valuable nutrition. Traditional foods are nutrient dense and contain high levels of vitamins A, C, D, and E, iron, zinc, and omega-3 fatty acids, and have been documented to improve overall health.[10, 11, 24, 25] Fruits

and vegetables are also important for health because they are associated with low LDL cholesterol, decrease risk of obesity, and decreased risk of cancer.[26-28] Traditional diets, with their high levels of micronutrients, are often better than the market food options in much of the rural north because the market foods available are often highly processed. For example, the market foods primarily being eaten in a study of Canadian Indigenous peoples are inexpensive, nutrient poor, low quality, and energy dense.[2]

FOOD SECURITY

This nutrition transition has led to a complex mixed subsistence-cash economy that must be considered when studying food security in the Arctic.[10, 12] The dependence on store bought foods is reflected in surveys on food security in Barrow, which document that a large majority of people have experienced food shortages due to a lack of resources at the grocery store.[29] Ninety-five percent of food comes from outside of Alaska, arriving via barge, plane, and truck.[30] This dependence highlights the necessity to find new and creative ways to address food security in rural Alaska. A study of Alaska's food security showed that if food was prevented from being shipped to Alaska because of a major event, then grocery store shelves would be empty in three to six days.[30]

Traditional foods are important to Alaska Native people, yet many challenges exist in procuring these foods. Many Alaskans prefer wild game with 63% of all Arctic households taking game, 92% consuming game, and 78% and 96% taking and consuming fish respectively.[12] These subsistence or country foods provide 48% of the Arctic population's daily calories and cost an estimated $31 million to replace.[12] Fuel costs in rural communities substantially increases the cost of subsistence based foods, as most are now procured through the use of snow machines,

boats and four-wheelers. Also of importance is the way that food is shared and distributed: social networks of production, sharing, and trading are vital cultural practices within Indigenous Arctic populations.[12, 31] Other issues affecting food security include contaminants, subsistence conflicts (among users and regarding policy), climate change, and habitat loss due to development.[11, 12, 18, 32-34]

Food security is not just a matter of having access to food, but access to nutrient rich and culturally desirable foods.[1, 35] The Alaskan Inuit Food Security Conceptual Framework states that these foods are "physically and spiritually craved and needed from the land, air, and water, which provide for families and future generations through the practice of Inuit customs and spirituality, languages, knowledge, policies, management practices and self-governance."[35] A dependence on market foods has created vulnerability in northern food systems, and severed the relationship between healthy ecosystems and healthy people.[16] For these reasons it has been suggested that food security needs to be addressed in diverse and creative ways in order to be most effective. Gerlach and Loring[1] suggest the idea of a food portfolio, in which the more different food resources are available, the more depth the portfolio has and the more stable and secure a population is. Coastal communities have been suggested to have more diversity in resources,[1] but changes in climate have begun to affect availability and access to those resources.[11] For example, warming ocean temperatures have affected ice characteristics including depth, an important consideration as the ice is used as a means of transportation out to hunting areas.[36]

Alaskan Inuit food security can further be defined as "the natural right of all Inuit to be part of the ecosystem, to access food and to care-take, protect and respect all of life, land,

water, and air."[35] This also includes the passing down of knowledge and the understanding of the vital link food has in cultural identity.[35] Maintaining access to subsistence foods; changing regulations as climate changes animal patterns and habits; limiting development of resource rich areas; protecting important feeding, breeding, and migratory routes of animals; expanding food storage within the state and access to food outside Alaska; and strengthening current agricultural programs are all major areas of concern when considering food security.[1, 11, 12, 30, 35] These aspects are important in Inuit communities for maintaining food sovereignty, which is a requirement of food security.[35] Around the world wild plants have played a critical role in nutrition, providing micronutrients available from few other sources, and thereby contributing to food security, as well as food sovereignty.[19]

NATIVE PLANT USAGE

The Iñupiat of northern Alaska had and continue to have a meat based diet, consisting of whale, seal, walrus, caribou, ducks, geese, and other wild game.[13] Traditionally they also had a strong plant gathering practice, harvesting berries, greens, roots, moss, and trees (and other materials found at treeline). Plants such as *uqpik* or willow (*Salix* spp.), *quŋulliq* or mountain sorrel (*Oxyria digyna*), and *quagaq* or sourdock (*Rumex arcticus*) were stewed, fermented or preserved in oil to be eaten through the winter.[37, 38] This food provides necessary fiber and nutrients at key times of year; *quaġaq*, *quŋulliq*, and *uqpik* are all important sources of vitamin C.[39, 40] *Masu* or Eskimo potato (*Hedysarum alpinum*) is an important starch that helps get people through the winter when meat is scarce and it is a good source of fiber. [13, 38] Other plants such as *sargiġruaq* or stinkweed (*Artemesia tilesii*) and *tilaaqqiq* or Labrador tea (*Rhododendron*

tomentosum) are important in folk medicine, used in teas, poultices, and salves to promote health and healing.[37, 38]

Little data exist on the nutritional composition of plants used in Arctic Alaska; only ten species of plants are included in the United States Department of Agriculture National Nutrient Database.[18, 40] In addition, analyses that have been conducted may not accurately reflect the nutrient content of the plants in different locations, as the plants' micronutrients depend on the climate and nutrients available to them in the soil, as documented in Alaskan blueberries.[41] While little data exists on Arctic Alaska plants, gathered plants are a local, fresh, low calorie, high fiber, sustainable source of food, and are more nutrient dense than cultivated varieties.[15]

Berries play an important role in the culture, tradition, and nutrition of Alaska Native peoples. Berries and specifically *aqpik* or cloudberry (*Rubus chamaemorus*) and *asiat* or blueberry (*Vaccinium uliginosum*), could be considered a cultural keystone for the importance placed on them and their ongoing prevalence in the Iñupiaq diet.[42, 43] Of all the plants traditionally gathered, berries are still the most ubiquitously gathered and bartered for across the state. *Aqpiks* and *asiats* are traditionally fermented with many of the greens and are a main ingredient in the common dish, *akutaq*.[38] Flint et al. documented that people pick berries primarily for food, but also to spend time outside with family, for traditional reasons, fun, and for health or medicinal reasons.[44] A recent study in western Alaska determined that 0.1% of energy from traditional foods was from wild greens, in comparison to 2.7% of energy from berries.[9] *Aqpik*, *kimmiŋñaq* or lowbush cranberry (*Vaccinium vitis-idaea*), *paunġaq* or blackberry (*Empetrum nigrum*), and *asiat* are harvested every year by Iñupiat people and supplement nutrition with vitamin A, C, and/or calcium.[13, 40] Antioxidant activity from berries is a component

of the broader nutritional composition gained from a wild plant diet.[19] Berries have greater antioxidant levels the further north they grow; Alaskan blueberries having a higher oxygen radical absorption capacity (ORAC) than cultivated blueberries or those from lower latitudes.[41, 43]

Using wild plants is important to numerous dimensions of health. Plants have secondary metabolites that contain medicinal compounds used to treat ailments, but one must understand which plants contain the needed compounds or produce the desired result.[45] Gathered plants also have benefits beyond nutrition such as increased physical activity and time spent outside socializing to gather them. These gathering practices are all declining and there is a concern that knowledge will be lost because people are not spending as much time on the land due to the adoption of western culture (work, technology, convenience).[13, 46]

TRADITIONAL KNOWLEDGE

Indigenous knowledge is grounded in and taught through interactions with the natural environment.[7, 47] Outdoor settings have been found to be a key in traditional plant knowledge acquisition[48] which could explain why there is a disconnect from nature in the youth of western cultures who continue to spend more time inside.[49, 50] Where traditionally children learned much of their knowledge through observing and helping their parents, now in much of the world more of a child's time is spent in schools learning from teachers, books, and other students.[51, 52] The amount of time spent in a place, out on the land, is directly related to how much local ecological knowledge one gains.[53]

There is concern within the ethnobotany community that traditional knowledge is being eroded.[48, 54, 55] Many issues can affect the preservation and transfer of knowledge, from within individual families to whole cultures, and ethnobotanical knowledge, primarily transmitted

through oral traditions, is especially vulnerable to decay.[48] On a large scale, deterioration of Indigenous knowledge is due to a history of imperialism, forced assimilation (including through Eurocentric education), and marginalization.[7] Unfortunately, many of these issues continue as development threatens the physical lands of Indigenous people[54] Indigenous people are making efforts to preserve traditional knowledge through a number of activities, including tape recording stories and conversations so this knowledge will not be lost.[13, 56] The nutrition transition has also had a detrimental effect, leading to a loss of knowledge about locally available foods as people have adapted to the market food culture and have come to believe these market foods are necessary for good health.[57]

Another component affecting knowledge transmission is land and resource use. As more natural habitat is developed into monocultures, tourist destinations, real estate, and industries, a person's social-ecological relationship (including food acquisition) has been and will continue changing.[6, 54, 55] This development often occurs at the cost of biodiversity, which has been directly correlated to cultural diversity.[54] People must then adapt and become resilient as they adjust to biodiversity and resource loss.[55] Often these people are then forced to move into more urban areas, potentially with less access to traditional foods and medicines.[54, 55] As people distance themselves from nature, their knowledge, understanding, and use of raw natural resources decreases.[54, 57] This distancing creates a devaluing of ethnobotanical knowledge as well as a devaluing of the environment in general. Because knowledge, including traditional knowledge, is dynamic and continues changing over time it may evolve to include new foods, plants, and medicines that benefit the community in new ways.[7, 55]

Food security and nutrition can be improved with gardens.[58-60] Studies have been conducted in the United States and elsewhere examining the motivators, facilitators, and barriers for gardening.[60-62] Motivators have been found to include health benefits, access to fresh produce, connecting with nature, and social opportunities.[60, 61] Barriers range from social: loss/lack of knowledge, busy schedules, perceptions of cost, and theft in community plots to agronomic/biological: access to land and water.[61, 62] Krush[63] concluded that action must start from the bottom up and gardening needs to be shown as a successful venture before more people will join in. She points out that on the Lakota Rosebud reservation leading by action and creating dialogue among community members was the most appropriate and effective method of outreach. Even with demonstrations and support, Rosebud reservation still struggled with participation and commitment from adults in the community.[63] Facilitators included using different forms of education to reach numerous audiences and to address the Indigenous hands-on learning style[61] and cultural values around gathering food.[62] Draeger and Schweser[64] determined that establishing networks and collaborative relationships among growers helped build overall food security through joint grant applications, improved and increased dissemination of knowledge, and supporting each other's local food initiatives.

Gardening has been encouraged as part of improving food security in Alaska;[30, 34] however, it is unknown if the above mentioned barriers, facilitators, and motivators will be the same in Alaska. The University of Alaska Cooperative Extension Service has operated several programs to encourage gardening and improve overall food security in rural locations, with some limited success.[65-67] Planting and harvesting of test plots often occurred in a haphazard

manner,[66] and little interest was shown in programs to improve food security such as developing a fundable community food project.[65] From Bacsujlaky's experience, she suspects that these failures could be due to the fact that food security and development of a community food project is not a high level concern currently, and may be an inefficient use of minimal resources, human resources in particular.[68] Instead of implementing programs from the top down in a culture with a limited gardening tradition, gardening must occur from the individual and community level when communities are ready.[61, 63, 68]

In many Alaska Native communities, gardening was not a traditional practice prior to colonization.[69, 70] With the arrival of foreigners, gardens were established at outposts and villages across the state. Teachers, health officers, and missionaries were encouraged by the government to develop and teach "locals" gardening skills.[58] These efforts were thought to be a waste as Alaska Natives would garden one year and then completely ignore the garden the next.[58, 69] However, in many areas of the state, gardens were adopted into traditional food systems and utilized depending on other seasonal activities and hunting success.[58]

Dearborn[69] writes that the Indigenous people of the Arctic did not do any type of cultivation and would have to significantly change their mindset from that of consumption to production, as if those who cultivate the land are more advanced in some way. This conclusion is not only demeaning, but incorrect. It ignores the fact that Alaska Native peoples have been known to cultivate their berry patches, weeding, reseeding and encouraging new growth for higher berry yield, culling trees to encourage the growth of greens, and spreading kelp in areas to improve soil nutrients.[70-72] Traditional cultivation also included growing potatoes in Southeast Alaska.[70, 73]

Gardening has been recorded in the Arctic, including in Russia and as a mainstay in coastal, northern Norway, above the Arctic Circle since the eighteenth century.[69, 74] That region of the Arctic does not have sea ice due to a more moderate climate influenced by the Atlantic Ocean/Norwegian Sea.[74] These examples of local, historical gardens could provide insight into the incorporation and encoding of cultural traditions for new methods to provide nutrients and sustenance.[74] Dearborn[69] did research on the potential for agriculture in northwestern Alaska (Kobuk, Ambler, Shungnak, Kiana, Noatak) and determined that many crops were suitable and could be produced in large quantities in the fertile river deltas. The north coast of Alaska has never been an ideal place to garden due to the short, cool, windy summers. As climate change continues to affect the Arctic at a rapid pace, these limitations may be less drastic, leading to a new opportunity for food security.

WELLNESS

Gardening and subsistence gathering can both play an important role in wellness. Health encompasses more than just human biology and can be defined differently depending on cultural constructs.[32, 44] To best understand the concept of wellness it is useful to understand that different worldviews exist and different cultures see wellness differently.[32] For example, simply presenting the nutritional benefits of the plants is not adequate in encompassing the health rewards of gathering plants. A multi-disciplinary approach to health[16, 32] and using the holistic term, wellness[44] gives a more all-encompassing awareness. The Iñupiaq Learning Framework and Iñupiaq Core Values both provide insight into wellness through an Iñupiaq lens. The Framework contains four realms: community, individual, history, and environment, while the twelve Core Values are based on sharing, respect, kindness. All of these elements influence

wellbeing.[47, 75] Looking at health through this lens can reveal gaps in understanding current food choice behaviors.[32]

Traditional foods of the Arctic have provided the nutrients and calories needed for people to subsist for thousands of years. Even with contemporary risks of eating some traditional foods within the Arctic, primarily due to high levels of contaminants that make their way into the Arctic ecosystem, research still currently supports eating these foods.[11, 18, 32, 44] Benefits of Arctic foods include not only higher levels of vitamins and minerals; traditional foods have also been found to protect against diseases such as obesity and diabetes.[15] The Alaska Inuit Food Security Conceptual Framework states that the health and wellness of the people depends on the health and wellness of the environment.[35]

Wellness goes beyond physical health to include psychological, social, environmental, and spiritual wellbeing.[44, 46] Activities around traditional food practices have been proven to play an important part in contemporary Alaska Native life and can have a positive effect on health.[46, 76] Having a strong connection to one's culture has been determined to positively relate to overall wellbeing.[11, 77] Mental health is a topic of concern particularly among northern Indigenous groups with high rates of violence and suicide.[21] Mental wellness is directly related to physical wellness which is evident in the Yup'ik tradition of dance as a form of medicine and healing.[78] Physical activity improves self-esteem and has been documented to have a beneficial effect on depression, a common disorder in northern latitudes.[79] Gardening has also been used as a form of therapy and to improve wellbeing.[5] Studies have proven that time spent outside leads to lower stress and clearer thinking.[4] People are drawn to plants, and have a more positive outlook on life when exposed to greenery.[4] The action of harvesting, passing on of knowledge,

community participation, and sharing networks are all components that make traditional activities healthy.[10, 11, 32, 57, 76] Focusing on these acts and values as well as culture, spirituality, and traditions can help form culturally appropriate health care.[6, 46, 80]

CONNECTING TO THE LAND

Physical, spiritual, and mental health are all connected to living in relation with the land.[16, 77, 81] Around the world people are spending more time inside looking at screens. Anecdotal evidence and personal communication with Elders demonstrates that trend is also occurring in rural Alaska.[46] Children are better able to identify pretend animals from games than local plants and animals.[82] Procuring food, whether hunting and gathering, or gardening, gets the consumer outside, moving, and connecting with the natural world. Time spent in nature has been shown to reduce stress, lower blood pressure and improve overall feelings of wellbeing.[4] There is also a correlation between sense of community and desire to help each other and time spent in nature, showing the inter-relationships between people and the land.[11, 46]

In Indigenous cultures, people know that their health is directly related to the land.[4, 35, 77] Part of the Yup'ik epistemology is the concept of *Ella*, which is the interconnectedness of all.[78, 83] *Ella* is cultivated through building relationships with other living and non-living beings to maintain that interconnectedness.[83] Indigenous people consider themselves a part of the ecosystem, interacting with the other parts just as each member of the system does.[77, 78, 84, 85] Margolin[47] echoes this sentiment in discussing teaching and the fact that all things on Earth have something to teach us: knowledge is not only held by humans. This relationship humans have with the ecosystem is complex, changes over time, and is shaped by culture, economy, technology, environment, and politics.[32, 84]

This concept of connection is important to the health of the land as well as the people.[32, 77, 85] Studies have revealed that Indigenous people take part in biodiversity conservation, invasive species control, wildfire abatement, carbon sequestration, and water resource management among other environmental services.[32] Biodiversity has been proven to directly correlate with cultural diversity, each supporting the other in maintaining existence.[85] Yup'ik elders teach the importance of respecting nature, which includes respecting the weather, plants, animals, people, the land, and showing gratitude for what the land provides. They also teach about abstaining from detrimental practices that may harm the land.[86] Harvesting plants is a reminder of the connection to the land and ancestors.[13]

WHY GARDENING AND GATHERING?

The Iñupiat people have survived and in fact thrived without cultivated crops such as broccoli and carrots for centuries, and if they continue eating their traditional foods, it has been concluded that they will remain strong, healthy people.[38, 87] The globalization of the world has affected all areas of life, including diet and lifestyle.[84] This introduction of an oil driven, cash based economy, a nutrition transition, and a more sedentary lifestyle that has been permeating into Arctic Alaska has many detrimental effects.[10, 44, 46] The loss of traditional knowledge and practices is felt strongly by Indigenous peoples as that is a source of wellness.[11, 46] Traditions, however, are also dynamic and can change and evolve with time.[7, 84]

Indigenous cultures have been taking part in the market economy as a means to improve livelihoods and bring ease to their lives; but this participation does not change the fact that they have their own worldview and ideas about conservation and use of their resources.[84] Berkes[84] notes that Indigenous and western systems have been combined into successful management

systems, including agricultural, around the world. The success of these types of combinations depends on the viability of the activity within the local culture, biological constraints, economic capacity, and environmental sustainability.[84]

Gardening and gathering both continue to promote wellness through multiple avenues. A relationship to the land continues through the cultivation and growing of crops or gathering wild greens and berries, albeit different types of relationships as pointed out by Dearborn.[69] Both activities get participants outside, physically active, and interacting with plants which all play a role in health.[4, 5, 10, 76] Vegetables have become nutritionally more important with recent dietary changes.[10] Collecting and harvesting greens, whether cultivated or wild, can be done as a community and can foster social wellbeing.[5] By maintaining and developing new sources of local food, communities are empowered to take charge of their food security and wellbeing.[1]

The incorporation of gardening is not meant to replace traditional harvesting and gathering practices, but to supplement them.[1] Rural Alaskan villages, such as Barrow, are vulnerable if they continue to depend more and more on non-traditional market food from lower latitudes. Sourcing food locally not only promotes community pride, it establishes food sovereignty, builds food security, improves nutrition, and can be an environmentally friendly practice.[10, 57] Resource management changes over time due to internal and external pressures. The ability to adapt is a good measure of the sustainability of the system, and an important skill for those in rural areas dependent on natural resources as part of their livelihood.[84] Gathering and gardening promote wellness through movement, nutrient dense food, spending time outside, and strengthening bonds between generations.[10, 24, 44]

CONCLUDING THOUGHTS

Understanding the relationship between human wellness and plants has the potential to improve health on numerous levels. Wellness includes physical, psychological, social, environmental, and spiritual wellbeing.[44] Plants are not only important for nutrition--they play a role in medicine, structures, tools, warmth, shelter, and spirituality. Wellness can be promoted through activities such as gardening and gathering that bring people outside, encourage physical activity, promote social interaction, provide grounding and cultural connection, and encourage healthy eating.[4, 5, 10, 11, 32, 61]

Gardening and gathering combined with market foods (referred to as grocery hereafter) make the three primary sources of fruits and vegetables available in rural Alaska. This literature review was done to support formative research conducted on the role these three sources of plants play in wellness in Barrow, Alaska. This thesis research explored whether different sources of edible plants (gathered, grocery, or gardened) play varying roles in wellness. In addition, it investigated whether barriers to buying store bought produce and wild gathering make gardening more appealing as a supplemental local food source. Understanding the facilitators and barriers of the three sources (gathering, grocery, and gardening) of fruits and vegetables and the perceived role those sources play in wellness will help to form more culturally appropriate intervention programs, which address nutrition and holistic wellness in a way that makes sense to the community and will facilitate healthier lifestyles. To address wellness holistically in an Indigenous community, researchers must understand the worldview of the community and the drivers affecting health on all levels, especially culturally. Interventions must take into account the historical food patterns and ways of living, as well as current

behaviors and future potential activities and interests to create sustainable, effective, and relevant programs.

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Chapter 2 Wellness through the lens of gathering, gardening, and grocery[1]

Abstract

Objective: To assess the role cultivated and wild plants play in wellness, and understand current perceptions of gardening as a source of vegetables and improved wellness.

Design: Mixed methods: 7 focus groups, 60 minutes each, audio recorded; questionnaire.

Setting: Barrow, Alaska

Participants: Alaska Native adults were recruited to participate. Eighteen participants were involved in 7 focus groups.

Analysis: Focus group recordings were transcribed and coded in Atlas.ti for themes. Questionnaire data were compiled in Microsoft Excel and analyzed using descriptive statistics.

Results: Gathering played a strong role in wellness, in particular, as it relates to nutrition, connection to the land, traditional foods, culture, and medicine. However, participants also reported lacking knowledge about plants from the tundra. The overwhelming majority of plants consumed were from the grocery store. In contrast to gathered plants, participants' perceived that plants from the grocery store only address one dimension of wellness—dietary health. Gardening was perceived as a valuable new local source of fruits and vegetables.

Conclusions and Implications: Our results provide insight into the role that plants play in wellness in an Alaska Native community that is experiencing a nutrition transition. Fruits and vegetables from the garden, grocery store, and tundra each play important, but different roles in wellness which is consistent with previous studies and highlights the importance of considering each

[1] Busby, S. and Bersamin, A. 2016. Wellness through the lens of gathering, gardening, and grocery. Prepared for submission in Journal of Nutrition Education and Behavior.

source when addressing wellness in Alaska Native communities. In addition, having a diverse food portfolio that includes fruits and vegetables from all three sources, especially local sources, is key to achieving food security and sovereignty.

INTRODUCTION

Indigenous peoples of Alaska, including the Iñupiat, have experienced a nutrition transition over the past century. [1-3] This transition away from a diet based on traditional foods toward a diet based on foods from the store, combined with changing activity patterns and genetic predisposition may contribute to the increase in diabetes and obesity among Alaska Native and other Indigenous people. [1-5] Plants, including fruit and vegetables (F&V), play a central role in preventing diabetes and obesity, and promoting optimal health. Obtaining a balanced diet that includes plants, however, is challenging in the Arctic for a number of reasons. First, hunting and fishing have been central to the diet, serving as the primary source of calories which means most time and energy is spent on these activities. Second, a short growing season limits the time that plants can be gathered or grown.[6]

Traditionally, Iñupiat people gathered plants, such as *uqpik* or willow (*Salix* spp.), *quŋulliq* or mountain sorrel (*Oxyria digyna*), and *quagaq* or sourdock (*Rumex arcticus*), and preserved them in oil through fermentation, to have small quantities available through the winter.[7] Even though plants were a small portion of the diet, they played an important role in the health of Iñupiat people. Northern plants have highly concentrated levels of vitamins A and C in addition to having significantly higher levels of antioxidants than grocery foods. [8, 9 5] These wild plants are not only local, nutrient dense foods, many also contain secondary metabolites that have been used in traditional medicine practices. [2, 4, 10]

Dietary health is not the only aspect of wellbeing affected by the nutrition transition. Indigenous peoples' health is tied to the land and if they are no longer engaging with it, that relationship weakens and health suffers.[11] Gathering plants is part of a greater set of land based activities that support the holistic health of Indigenous peoples. These land based activities shape Indigenous peoples' connection with the land, which is central to their worldview and health. [12-16] Gathering supports multiple components of wellness including physical, psychological, social, environmental, and spiritual wellbeing. [3, 12, 16-18] The Inuit Circumpolar Council explains the multi-dimensional relationship between the traditional food and wellbeing, stating that "food is a lifeline and connection between the past and today's self and cultural identity."[19] This lifeline is being compromised as food access and opportunities continues to change.[5, 20, 21]

The nutrition transition has affected food security as people have transitioned toward grocery foods, creating a need to diversify the food portfolio to ensure food security.[22] Agriculture, and more specifically small scale gardening, has the potential to supplement the current food system in rural Alaska. Gardening is important not only for diversifying the food portfolio, but also as a means to improve nutrition in rural Alaska.[22] Indigenous communities elsewhere in the United States have shown an interest in gardening to promote healthier lifestyles. [23, 24] Kortright and Wakefield [25] determined that those participating in gardening adopt healthier diets and these healthy eating habits are then passed on to their children.

Traditional and local knowledge of the environment gives the Iñupiat an understanding and awareness of the ecosystem that could prove useful in managing a garden. Developing gardens and especially greenhouses is an expensive and time-consuming investment.

Determining the community's desire for fresh local vegetables and interest in participating in the growing of this local produce is an economically smart step toward creating or supplementing local food systems. If a program such as a community garden is going to be sustainable, it must have the support and physical investment of the community. [24]

This formative research had two main objectives. The first objective was to understand the role cultivated (grocery and garden) and wild plants (gathering) play in wellness, in order to inform culturally appropriate nutrition and health education and interventions. These three sources of F&V represent past (gathering), current (grocery and gathering), and potential future (garden) access to F&V in rural Alaska. The second objective was to understand current perceptions of gardening as a source of vegetables and improved wellness in order to inform and maximize success of local garden projects. Recent studies have determined that it is important to understand local perceptions and attitudes about wellness and access to F&V to create culturally appropriate health promotions that have the best chance for success. [18, 24, 26] Desired outcomes included stimulating community discussion around wellness, food, and specifically F&V intake, and increasing awareness and encouraging healthy behaviors.

METHODS

Study Design

A mixed methods approach involving focus groups and a questionnaire was used in gathering data for this convergent embedded designed case study. [27] Focus group style interviews were chosen as the primary method because they create a space for different viewpoints and discussion which is important when exploring a new domain. [28] At the end of the

focus group a structured questionnaire with close-ended questions was administered to the focus group participants to gain quantitative data on current interest and practices.

Five focus group interviews and two individual interviews were conducted. One participant attended two of the focus groups, but with different people to talk to, new information emerged. Focus groups were recorded and lasted approximately 50 minutes. The individual interviews were not recorded, so analysis is based on notes and interviewees written responses to the prompts. The structured questionnaire was filled out by all focus group participants (n=18). Participants were provided food and at the end of each session they received a $20 gift card, lettuce seeds, and a book on gathering as appreciation. The research was reviewed and received expedited approval by the University of Alaska Fairbanks Institutional Review Board, and written consent was obtained from all participants.

Setting

This study took place in Barrow, Alaska. Barrow is the northernmost village in Alaska, located just east of Point Barrow, on the Bering Sea. It is off the road system and accessible only by air or sea. Based on the most recent census it has a population of 4,429 of which 61% are Iñupiat.[29] Barrow's climate is cold and dry, with frequent strong winds. The mean temperature for June, July, and August from 2000 to 2016 was 39 ˚F, July was the warmest with an average maximum temperature of 57.3˚F. [30] The cost of living in Barrow is high with gasoline costing $7 per gallon during the winter of 2015. [31] Barrow has a grocery store that sells a variety of fresh produce, but at high prices due to the cost of shipping (granny smith apples: $4/lb, plums: $6/lb, watermelon wedges: $6/lb). This research was conducted in conjunction with the Samuel Simmonds Memorial Hospital Diabetes Prevention Program and Cooperative Extension Services

at Iḷisaġvik College who are currently piloting a garden of cultivated produce and creating an ethnobotanical tundra garden.

Participants

Focus groups were open to any Alaska Native community member over eighteen years old. The study was aimed at community members with varied knowledge and use of plants, which led to recruitment through two sampling methods. Purposive sampling and specifically snowballing were employed to enlist local plant gatherers and elders. Convenience sampling involved recruiting through advertisements on flyers posted around the village, public radio announcements, and notices on several community Facebook pages. The researcher also made verbal announcements at various locations where residents gathered.

Measures

Focus group interviews were conducted in a semi-structured format, using prompts to direct conversation. Because this research is concerned with the role plants play in wellness, the focus groups began by asking participants to characterize wellness. Prompts were then used to discuss the role of edible tundra plants, the act of gathering, grocery store plants, and gardening play in wellness. Perceived barriers to eating plants were also explored. The interview questions were piloted, refined with participant feedback, and reviewed by key stakeholders (n=5) prior to the start of the study.

Participants completed a questionnaire that was designed to collect demographic information and triangulate responses from the focus groups.[32] Questionnaires were kept anonymous so answers cannot be linked to specific participants. Demographic information collected included age, gender, ethnicity, education, and length of residency in Barrow. Nine questions were created to provide details that may not be discussed in depth in the focus group,

for example, the number of times someone gathers plants each summer, issues of food security and sovereignty, and knowledge and/or interest in learning about traditional plants and gardening. The questions provided an opportunity for participants to more clearly voice preference and importance of different sources of fruits and vegetables. The questionnaire was reviewed by key stakeholders (n=5) to test for face validity and determined to be a good assessment tool.

Analyses

Focus group interviews were transcribed verbatim by the researcher to maintain context and allow for interpretation based on participant's expression of thoughts through oral language.[28] Atlas.ti (version 7.5.7, ATLAS.ti GmbH, Berlin, 2015) was used to code the transcripts. Codes were primarily descriptive in nature, using the main research questions to dictate four main structural codes (wellness, gathering, grocery, garden); additional codes were created as new categories and patterns appeared. Subcodes were developed to further organize patterns.[33] A subset of transcripts were independently coded by a colleague in the nutrition field to further validate and confirm code assignments. Co-occurrence tables and network analysis tools within Atlas.ti (version 7.5.7, ATLAS.ti GmbH, Berlin, 2015) were used to further explore relationships between codes.

The questionnaire was analyzed using descriptive statistics, using Microsoft Excel (Microsoft Office, Microsoft Developer Network, Redmond, WA, 2013) to perform univariate analysis of responses (Table 1). Because of the small sample size (n=18) and limited scope of information available from the questionnaire, inferential statistics were not employed.

RESULTS

All participants were Iñupiat women. The majority of the participants were over the age of 55 years old and the mean number of years lived in Barrow was 40 (Table 1). Most participants (n=15) gather less than five times per year, however over half (n=10) had some familiarity with the types of plants gathered in the region (Table 2). Access to F&V was reported as very important (n=15) and respondents reported wanting more information about different sources of F&V (n=12 for gardening, n=18 for gathering).

In order to examine the role plants play in wellness, participants first discussed what wellness looked like to them. Twenty themes came out of this discussion (Table 3). The two most frequently mentioned themes were physical health and mobility, and prevention, or staying healthy. Nutrition, traditional foods, mental, emotion, and holistic health were other themes mentioned frequently. The many facets of wellness was expressed by a participant: *"And that's the thing, you can't always see wellness, it's something you have to feel in your body, and it's not just a number it's a complex subject, wellness- there's a lot of aspects to it. But plants help me feel well."*

Gathering

Gathering was found to play a strong role in wellness, in particular, as it relates to nutrition, connection to the land, traditional foods, culture, and medicine. The latter four themes could all be combined into a larger theme involving Iñupiaq worldview that dominated conversations about wellness and gathering. This is important to note because while participants did associate tundra plants with nutrition to some degree, the role they play in culture was clearly more important. Participants shared that gathering is important in social health within families and across communities through trade. It was also discussed in terms of

getting out and being physically active and having quiet time to commune with the land. One participant explained their relationship with gathering as:

"Long ago our ancestors never had grocery stores, so for their fruit and veggie intake it would be what was provided to them in the environment they lived in. They knew what was good for what, whether it was for food, or medicinal use. So picking for plants and berries has been passed down. Like I mentioned earlier, the plants and berries we pick do not just satisfy our stomachs, but somehow it satisfies our soul. Probably because of the connections we have with our land. When we have that connection, it plays a huge role in wellness as Iñupiaq people. "

Primary barriers to gathering were cost, knowledge, land, and support. Cost includes money to buy a vehicle for transportation, gas for the vehicle, and time off work to go and gather. Land included issues with access to land, land regulations, and the location of plants to gather. Support refers to interest and support from family members whether emotional, financial, or transportation related. Lack of mentors or friends to go out and gather with also were included in this theme. Barriers were discussed the most with gathering, showing the many struggles talked about in trying to still gather. Lack of transportation and knowledge are barriers expressed below:

"We need transportation, we need a boat, we need a 4-wheeler, to do now a-days, to do what we need to do to pick plants."

"It's like one thing at a time, but since it's not being done daily anymore we're not being exposed to it, so you have to seek it out and find the people that do do that still… I think the exposure for me, not having that exposure."

Other major themes discussed in relation to gathering included positive interest and personal experiences gathering plants. Participants expressed a strong interest in learning the what, where, and how of gathering local plants. Personal experiences of plant gathering with family or friends were expressed as a predictor of future gathering; these shared experiences being key to knowledge transmission and continuation of cultural practices. This optimism and desire for personal experiences to pass on traditional knowledge can be heard in:

"Gathering. I've never done that before and I don't even know what the plants look like. All I know are akpiks and that's the only thing I know. So I think gathering would be fun, and plus that bonding time. I really like that family bonding time. That really speaks to me. "

Grocery

Grocery F&V were primarily thought of in terms of nutrition. Most participants spoke of grocery foods as something they knew they should eat, but did not for many reasons. Some thoughts shared when asked about grocery F&V are:

"Yes, we'll having oranges during the high peak of flu season, having the vitamin C is very good"

"I think it is important for people to know what benefits the plants have with their traditional food because you know people are not eating like they should, like we did before. A lot of people use seal oil and they put in carrots and they put in there what other stuff that they could put in the seal oil and eat it with their dried meat."

Two major barriers were expressed in regards to eating F&V from the grocery store: cost and quality. Participants also expressed a lack of knowledge about what the grocery F&V were and how to use them, often influenced by a lack of F&V as a child, which can be seen in the examples below:

"Growing up we didn't eat vegetables. It's a challenge to remember to buy vegetables too. And then um, especially here, you know um, not having the means to go out there to um even learn what to pick. For me. And so it's a struggle. I'm not consistent eating vegetables, because we didn't grow up with that. So that's another barrier that we have to look at."

"A lot of our elders like the fresh foods in the summer…we get much more variety during the summer time. But during the winter time, you have to really watch what you buy over there [at the store] cause they are partially frozen. We like our salads, but we don't like a real frosty one, that's got a lot of freeze things. I hate buying them there cause you know when they thaw out they're no good, they're too mushy."

The impact the western diet and foods has had on Iñupiat people's health and eating behaviors was another prominent theme when talking about wellness and grocery foods. Participants showed a concern for new issues like the rise in chronic diseases related to the over-availability of processed foods that is the primary sustenance found in these communities, versus the healthier alternatives that are less readily available. Participants were aware that there are healthier options and lamented the fact that they used to be healthier. Concern about health can be heard in these expressions:

"They should open a, like a health, like the natural pantry, like a store that's got organics. Cause here they, there's, it's all just junk. Processed food"

"We've always been a very healthy people, with um, walking, hunting, picking, um, quagaq, qunuliq, butchering bearded seal. A lot of activity. There was no diabetes or high blood pressure. So, um, we really need to get everybody up and going."

Gardening

Gardening had the least defined role in wellness. Participants acknowledged that it would have a positive impact, but no major wellness themes emerged from the discussion. Many participants showed interest and enthusiasm in the prospect of gardening, as seen in this participant's response:

"I think it will [help improve wellness] if we knew how to garden! I'd love to try that!"

One barrier to gardening was a concern relating to the weather and potential for plants to actually grow. The other major barrier expressed was the current lack of knowledge about how to go about growing in Barrow. These thoughts and misconceptions can be seen below:

"I don't know if your plants going to grow. Are they planting? I think they plant too late. I think that by the time they grow, they gonna freeze. The first time, they should start right away, instead of make things first. Why don't they just open the ground and plant instead of trying to make a fancy place for them, because, by the time they grow, they gonna freeze, and they won't grow very rich. That's what my thought is about planting. You should plant right away instead of wasting time trying to make places for the plants to grow."

Participants also noted the need to try new things such as gardening to address issues of food security, health, and a changing climate. Several times participants noted the changes occurring and need for supplemental food:

"It's important I think for our Alaskan people to start planting cause the earth is changing so fast and whatever. Even greenhouses [gases] are coming up fast right? Like climate up here is getting warmer than lower 48 I think. I think they should start from there, plant early, cause all the, most of the ocean food we eat up here, they migrate earlier. Ah may, everything is changing fast."

"We need to know how to gather and know how these plants are, but because we need access to vegetables we need to be able to garden too. So they're not really, they're not one and the same, but it's super important for us to be able to access greens and to be able to eat healthy."

DISCUSSION

Our results provide insight into the role that plants play in wellness in an Alaska Native community that is experiencing a nutrition transition. Fruits and vegetables from the garden, grocery store, and tundra each play important, but different roles in wellness which is consistent with previous studies and highlights the importance of considering each source when addressing wellness in Alaska Native communities.[18, 24, 34] In addition, having a diverse food portfolio that includes F&V from all three sources, especially local sources, is key to achieving food security and sovereignty.[19, 21, 22]

Participants found that gathering played the strongest role in supporting many components of wellness including, culture, nature, and nutrition; however they also reported lacking knowledge about plants from the tundra and minimal practices in gathering or consuming plants gathered. This finding is consistent with research in Canada that shows that although Indigenous peoples still had a high level of traditional knowledge about local foods, they were now using relatively few. [35] The cost associated with gathering, lack of knowledge about gathering, and lack of time to gather were cited as the primary barriers to consuming plants on the tundra and in combination, may explain the low intake of tundra plants. A number of studies in Alaska support participants' views that gathering and eating tundra plants contribute to many core dimensions of wellness. [2, 18, 21, 26, 36] Indeed, the North Slope Borough's Baseline Community Health Analysis Report[37] states that "Subsistence, however, remains at the core of community

health in North Slope communities, providing not only an important source of nutritious food but social interaction, cultural pride, and physical activity." This apparent disconnect between the value placed on tundra plants and their low intake highlights the importance of identifying programs and policies that would increase intake of plants from the tundra and thereby promote holistic health

The overwhelming majority of plants consumed by participants were from the grocery store. In contrast to gathered plants, participants' perceived that plants from the grocery store only address one dimension of wellness-- dietary health. Perceptions around grocery F&V and wellness were primarily related to nutrition and showed a western understanding of the importance of eating F&V. For example, references to the food pyramid and daily recommendations were frequently mentioned. Participants knew more about the nutritional value of oranges than local greens and this lack of knowledge has the capability to disempower the local community by forcing it to be dependent on external foods and debilitate food sovereignty. Convenience makes fruits and vegetables from the grocery appealing, but high cost and poor quality make it difficult for residents to consume recommended levels of fruit and vegetables, despite understanding the nutritional benefits of FV from the store. As has been found with other Indigenous people, many participants were buying nutrient poor foods instead of nutrient dense foods like F&V, because they are a cheap convenient source of energy.[2, 5, 21] If rural Alaskans continue to be dependent on expensive produce from the grocery store for their vitamins, minerals, and fiber, diet related diseases will likely continue to rise, as villages are left with few choices but to buy low cost, high calorie foods.[20, 22]

Gardening was perceived as a valuable new local source of F&V. Based on the interest and optimism expressed by participants, there is a potential for using gardening as a means to increase F&V consumption, food security, and overall wellbeing. Participants' current perceptions of the role gardening plays in wellness were limited to a few general comments about health and healthy food. However, gardening, like gathering, can promote holistic health through improved eating habits, social engagement, time in nature, and physical activity.[21, 23, 24] The garden can be used as a tool to promote wellness by increasing local knowledge of methods to diversify the local food system, as demonstrated by the Learning Garden, which explored using local plant gathering traditions and cultivated gardening to rebuild local food systems.[35] In both this study and the Learning Garden study, strong local ties to culture mean that in order for interventions to be successful, they must include education that is relevant to cultural practices that encourage holistic wellness.[35] As reported by Lombard et al.,[24] some cultural and agronomic barriers will need to be addressed for gardening to be successful and sustainable. Educational approaches such as including teaching gardening methods and practices in a culturally appropriate way, as suggested by Lombard et al.,[24] would likely be useful in rural Alaska as well. Using these methods may help address some of the cultural barriers, such as a preference for hunting and ocean based activities, a lack of tradition gardening, and the need to be around to tend the garden through the season. Just as the nutrition transition occurring in rural Alaska is an ongoing process, so too is the creation of traditional knowledge;[38] and as knowledge changes and grows, gardening can become part of the solution to finding a balance in holistic health, including types and sources of food.

Limitations

This study had a small sample size comprised solely of women which may provide only one perspective. Although we do not capture the perspective of men, women are historically the main gatherers of plants for food and medicine which has led to a stronger relationship with plants, and they are therefore able to give a more accurate portrayal of changes in the people-plant relationship. The small sample size may have limited the variety of perspectives shared, but the participants' demographics were varied and saturation was reached across the focus groups. The relationship children have with plants is not understood and could provide insight into the changes occurring with each generation further removed from traditional food and knowledge in the nutrition transition. Conducting the focus groups in the summer may have limited participation as community members were often busy with other seasonal activities. The research took place after the prime plant gathering time, so as to make sure participants were not absent due to gathering. However, fishing and camping were occurring during this time which may have biased participation toward those that do not participate in subsistence activities. Participants were not randomly selected, which may lead to a lack of generalizability, but they were recruited from a wide variety of ages and educational backgrounds which led to a range of perspectives. While a larger study that included more communities is desirable to confirm large scale trends, this study was completed in a community that has one of the most extreme environments and least amount of gathering, so interventions and F&V promotion here may be most difficult. It was also done as action research to inform ongoing interventions in the community of Barrow and so is immediately applicable.

CONCLUSION/IMPLICATIONS FOR FUTURE RESEARCH AND PRACTICE

This research identified three areas to focus on in order to strengthen people's relationships with plants to promote in wellness in Barrow. First, encouraging knowledge transmission. This could be accomplished by creating opportunities for plant gathering experiences, supporting eating traditional foods including plants, and making information available about the how, what, and where of gathering and gardening. Johnson, Nobmann, and Asay[2] suggest tundra walks as one way to facilitate this knowledge transmission. Knowledge of a skill (such as plant identification) is correlated with behavior, (such as gathering) and behavior is then correlated with wellness.[21] Second, local health promotion programs should increase nutrition education about plants gathered and gardened. Currently people have a better understanding or at least awareness of the nutritional value of commercial produce. Research conducted in Western Alaska concluded that traditional foods should continue to be recommended as a healthy alternative and education efforts should highlight the major nutrients available in those foods.[2] Third, the community should strive toward developing community supported and created actions items, such as community meals and group chartered boats to berry and greens gathering areas. Navajo participants of a similar study in New Mexico preferred community actions and education that was culturally relevant and used experiential learning to teach gardening methods.[24] The Barrow Test Garden and Tundra Garden currently being piloted are great examples of this. Both are programs being co-developed by the Iḷisaġvik Cooperative Extension and Samuel Simmonds Memorial Hospital Diabetes Prevention Program as educational opportunities to teach community members about different types of edible plants. They focus on low barrier to entry plants, demonstrating the potential of gardening

cultivated crops and teaching identification and uses of tundra plants. Community members are being encouraged to grow their own windowsill microgreens and cooler greenhouses with materials available in Barrow. Future intervention plans include cooking and preserving demonstrations and tundra garden walks with diabetes patients to encourage physical activity and teach about other sources of micronutrients and fiber. Other suggestions include holding traditional foods only meals to provide a space to learn and try different types of foods, and how to prepare and preserve them, such as being done in Canada.[39] Many elders suggested sharing transportation such as chartering a local boat to bring a group up river to pick berries and greens. As these promising programs are evaluated, we will learn whether they will have a positive impact on intake of plants.

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Table 1. Demographic Data for Adults in Focus Groups (n=18)

Demographics of Participants	
Participants	n=18
Mean Age Range	45-54
Mean Years in Barrow	40
Gender	
Female	18
Ethnicity	
Iñupiat	18
Yup'ik	1
Other	2
Education	
No Schooling Completed	1
High School Graduate	5
Some College Credit	6
Associate Degree	2
Bachelor's Degree	3
Master's Degree	1

Table 2. Ethnobotanical Questionnaire Responses from Adults in Focus Groups (n=18)

Questions:	Never	1-5	6-10	>10
How many times during the summer do you gather tundra plants?	7	8	2	1

	Very important	Somewhat important	Not important
How important is it to have access to lands to gather traditional food plants?	15	3	0
How important is it to have consistent access to fruits and vegetables?	15	2	1

	Very familiar	Somewhat familiar	Not very familiar	Not familiar at all
How familiar are you with the types of traditional plants gathered around Barrow?	0	10	6	2

	Yes	No
Have you ever grown vegetables?	5	13

	Very interested	Maybe interested	Not interested
If you were given the resources and support to grow your own garden, how interested are you?	12	6	0

	Yes	Maybe	No	Not Sure
Would having a garden make you less worried about where you get your fruits and vegetables?	12	3	1	2
Would knowing which traditional plants to pick on the tundra make you less worried about where you get your fruits and vegetables?	12	3	2	1
Would you be interested in information on traditional food plants if it were available?	18	0	0	0

Appendix

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June 5, 2015

To: Andrea Bersamin, PhD
Principal Investigator

From: University of Alaska Fairbanks IRB

Re: [737151-2] Wellness Through the Lens of Gathering and Gardening

Thank you for submitting the Revision referenced below. The submission was handled by Administrative Review.

Title:	Wellness Through the Lens of Gathering and Gardening
Received:	June 4, 2015
Expedited Category:	7
Action:	APPROVED
Effective Date:	June 5, 2015
Expiration Date:	June 5, 2016

This action is included on the July 15, 2015 IRB Agenda.

No changes may be made to this project without the prior review and approval of the IRB. This includes, but is not limited to, changes in research scope, research tools, consent documents, personnel, or record storage location.